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ABSTRACT

This study examined divergence and convergence between students' and teachers' perceptions of teacher instructional behavior in terms of control of student learning, classroom management, and clarity. Survey data were collected from 72 secondary school teachers from seven schools and their 1,604 students. Teacher experience ranged from 1-29 years. Respondents completed the Questionnaire on Instructional Behavior. Data analysis indicated that one-third to one-half of the teachers differed considerably from their students, and of these divergent teachers, three-quarters to less than one-half had higher perceptions than their students. There was no statistical relationship between teaching experience and divergence. However, teachers with positive divergence on clarity and classroom management were relatively inexperienced, while those with negative divergence on those scales were more experienced. Ineffective teachers displayed more divergence for clarity, and teacher-centered teachers were less divergent on clarity and strong control than were teachers with other styles. The amount of divergence was related to the amount of clarity and shared control perceived by the students. Results suggest that the amount and direction of divergence may relate to the particular teacher behavior of interest. (Contains 68 references.) (SM)

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Comparing students' and teachers' perceptions of instructional behavior in Dutch secondary education.

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1. Introduction

Reseach over the last four decades has indicated that students' and teachers' perceptions are important elements in the social and psychological dimensions of classroom environments (Fraser, 1986, 1994, 1998). In the last 25 years, much attention has been given to the development and use of instruments to describe learning environments from the perspective of teachers and students (Fraser, 1998). Most of these instruments were questionnaires that mapped different aspects of teaching and learning in the classroom. They are based on general theories assuming that human behavior is shaped by the environment in interaction with the person (Lewin, 1936; Murray, 1938). Recently, learning environments researchers have also used other data sources, such as observations or interviews, in association with questionnaires (Fraser, 1998).

In 1991, Brekelmans and Wubbels concluded that the majority of the studies in the domains of 'teacher thinking' and 'classroom environments research' either focused on teachers or students, but that studies incorporating both students' and teachers' views on the classroom and teachers' behavior were scarce. Since their study, much has changed and many researchers have compared student and teacher perception of the classroom environment or teacher behavior (for an overview, see Fraser, 1998; den Brok, Levy, Rodriguez & Wubbels, 2002). Research investigating both teachers' and students' perceptions is regarded as important, because divergence and convergence between student and teacher perceptions have proven to be usable variables in investigating teaching-learning processes, or interesting points to seize upon in the preparation of teachers and staff development (Brekelmans & Wubbels, 1991).

The present study focusses on divergence and convergence between student and teacher perceptions of teachers' instructional behavior in terms of control of student learning, classroom management and clarity. These elements of teachers' instructional behavior were measured with the Questionnaire on Instructional Behavior (QIB, Lamberigts & Bergen, 2000). The study adds to the existing knowledge base in several ways.

First, the majority of the studies have focused on divergence with respect to teacher interpersonal behavior (e.g. den Brok, et al., 2002). Studies investigating divergence on control, classroom management and clarity have been conducted less frequently (exceptions are studies by Biemans, Jongmans, de Jong and Bergen, 1999; Beam and Horvat, 1975; Fraser, 1982; or Fisher and Fraser, 1983). Second, in cases where teachers' instructional behavior was the object of interest, differences between the perceptions of teachers and students often were not the explicit focus of study (e.g. Bergen, Derksen & Lamberigts, 1997; Derksen, Engelen, Sleegers, Bergen & Imants, 1999; Engelen, 2002; Engelen, Bergen, Derksen & Sleegers, 2000). As a result, differences or similarities between teachers' and students' perceptions were not statistically tested. Third, in most of the studies, statistical analyses, such as paired t-tests or analyses of variance (means analysis), were performed on normal difference scores. While such scores may be helpful in detecting and testing differences between teachers and students, they have a few limitations. One limitation is that positive and negative differences can balance each other out (Brekelmans & Wubbels, 1991). Another limitation is the fact that the analyses performed were useful to detect differences between groups of teachers and students, but fall short in determining if a particular difference between one teacher and his or her class can be regarded as 'large' or 'significant' (Brekelmans & Wubbels, 1991). Fourth, earlier studies on differences between students' and teachers' perceptions of instructional behavior using the QIB employed four scales (student-led activation, teacher-led activation, clarity and control), while recent multilevel factor analyses have shown that five - rather than four – scales make up students' perceptions of instructional behavior (den Brok, Bergen & Stahl, 2002; Lamberigts & Bergen, 2000). Apart from a new 'shared control' scale, some of the items of the classroom management scale appear to better fit in the teacher control (teacher-led activation) scale (den Brok, Bergen, & Stahl, 2002). These changes in the units of analyses may alter earlier results found, and, consequently, conclusions based on these outcomes.

This paper starts with an elaborate discussion on earlier research focussing at differences between teacher and student perceptions of teacher behavior. After this discussion, a number of hypotheses will be presented and tested. Finally, the method and results of the study will be presented.

2. Differences between student and teacher perceptions

A literature review was conducted on studies that included both students' and teachers' perceptions of teacher behavior. The complete list of reviewed studies in chronological order can be found in Appendix A[1]. In the following paragraphs, the outcomes of this review are discussed more in detail.

2.1 Studies on interpersonal behavior

Quite a number of studies have focused on differences between teachers' and students' perceptions with respect to *interpersonal teacher behavior* (den Brok, Levy, et. al., 2002). These studies investigated teacher behavior in terms of the two Leary (1957) based interpersonal dimensions of teacher influence and teacher proximity, or in terms of eight sectors of behavior that make up these dimensions – leadership, helpful/friendly, understanding, giving responsibility/freedom, uncertain, dissatisfied, admonishing and strict behavior – and used the Questionnaire on Teacher Interaction (QTI, Wubbels, Créton, & Hooymayers, 1985) to map students' and teachers' perceptions.

In most of these studies, considerable differences were reported between teachers' and students' perceptions. On average, teachers reported higher ratings of their own leadership, helpful/friendly and understanding behavior than did their students, while they reported lower perceptions of their own uncertain, dissatisfied and admonishing behavior (e.g. den Brok, Levy, et al., 2002; Fisher & Rickards, 2000; Harkin & Turner, 1997; Rickards & Fisher, 2000; Wubbels, Brekelmans & Hermans, 1987; Wubbels, Brekelmans & Hooymayers, 1992; Yuen, 1999). Some studies also reported higher teacher than student perceptions of strictness and lower teacher than student perceptions of giving responsibility (Fisher & Rickards, 2000; Rickards & Fisher, 2000). Behaviors for which teachers reported higher perceptions than their students – strictness, leadership, helpful/friendly and understanding – have found to be positively related to student achievement and motivation, while behaviors for which lower teacher than student perceptions were reported were negatively associated with student achievement and motivation (e.g. Brekelmans, Wubbels & den Brok, 2002; den Brok, 2001). The differences between teachers' and students' perceptions remained if the higher order interpersonal dimensions of influence and proximity were used (Brekelmans & Wubbels, 1991; Brekelmans, et al., 2002; Fisher, Fraser, Wubbels & Brekelmans, 1993; Levy, Wubbels & Brekelmans, 1993; Wubbels & Brekelmans, 1997).

Correlations between teachers' and students' perceptions seem to be moderate to low (Wubbels, et al., 1987). Looking at individual teacher-class combinations, Wubbels and colleagues (Wubbels, et al., 1992) found that 67 percent of the teachers had higher perceptions than their students on influence and proximity, while 33 percent had lower perceptions. Brekelmans and Wubbels (1991) reported that 92 percent of the teachers in their study showed divergence between their own perceptions and those of their students, and that two-third of the divergent teachers had higher perceptions than their students. A small number of studies reported non-significant differences between students' and teachers' perceptions (Ben-Chaim & Zoller, 2001; Wubbels & Levy, 1991).

It remains unclear to what extent differences in perceptions may be related to teacher experience. A study by Brekelmans and Wubbels (1991) on 1156 teachers showed no significant relationships between teacher experience and divergence or convergence between students' and teachers' perceptions of influence and proximity. However, longitudinal studies involving 51 and 573 teachers indicate that differences with respect to proximity become larger during the teaching career, while they remain equal or become smaller for influence (Brekelmans, et al., 2002; Brekelmans, Holvast & van Tartwijk, 1993). Other evidence is provided by a small study involving 6 individual teachers and qualitative data in the form of classroom observations and teacher interviews (Fisher,

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[1] We conducted an ERIC search using the following terms: 'student perceptions', 'student ratings', 'teacher perceptions' , 'teacher ratings', 'teacher behavior'. Documents were selected if they included one of the teacher and student search terms and if teacher behavior was the topic of interest. Also, we reviewed all issues of the journals 'Learning Environments Research', 'Teaching and Teacher Education' and 'Journal of Research on Classroom Interaction' from 1990 to 2001. Articles including the above search terms combinations in their title or abstract and focusing on teacher behavior were included in the overview. Finally, conference papers and other documents sent to us by colleagues were also included, as long as they were written in English. In the Appendix, only those studies are included that were conducted in secondary (vocational) education.

Fraser & Creswell, 1995). In the latter study, however, experience seemed to influence differences in perceptions together with (initial) interpersonal teaching style.

Differences between students' and teachers' perceptions of interpersonal behavior may also be related to ethnicity or cultural background of teachers and students. In one study, differences between Caucasian-American students and their Caucasian teachers were lower than between Asian-American or Hispanic-American students and their (Caucasian) teachers (Levy, Wubbels, Brekelmans & Morganfield, 1997). A study comparing U.S. and Dutch teachers showed that – while statistically non-significant – differences between American students and their teachers were somewhat smaller than between Dutch students and their teachers (Wubbels & Levy, 1991). In a third study, Hispanic-American teachers displayed larger divergence with their students than did Asian-American teachers (den Brok, Levy, et al., 2002). However, the latter study also showed that divergence between teacher and student perceptions is not related to both participants 'being of the same cultural background' or not.

Studies also investigated relationships between teaching style and divergence or convergence between teachers' and students' perceptions. These studies seemed to indicate that if student perceptions of influence and proximity were higher, divergence between students' and teachers' perceptions was smaller (Brekelmans & Wubbels, 1991; Wubbels, et al., 1987; 1992).

Summarizing the literature on interpersonal behavior, it can be concluded that most teachers have higher perceptions than their students for behaviors that are positively related to student outcomes, while they have lower perceptions for areas that are negatively associated with student outcomes. Moreover, divergence may be related to experience, ethnicity and interpersonal teaching style.

2.2 Studies on other classroom environment or teaching elements

Studies on differences between students' and teachers' perceptions outside the domain of interpersonal behavior investigate a variety of aspects, but nevertheless show similar patterns. Statistically significant differences have been reported between students' and teachers' perceptions of teacher personal involvement, differentiation, stimulating student participation and promoting student independence (Fraser, 1982; Fisher & Fraser, 1983; Hofstein & Lazarowitz, 1986), task orientation, providing order and rule clarification (Fraser & Wubbels, 1995; Maor & Fraser, 1985), verbal and nonverbal teacher immediacy (Gorham & Zakahi, 1990), competition, democracy, goal direction, task difficulty, satisfaction, formality, involvement, rule clarity and cohesiveness (Moos, 1979), promoting student inquiry (Beam & Horvat, 1975), gender differentiation (Martin & Combs, 2000) and feedback (Voeller, 1982). Higher teacher than student perceptions have also been reported for primary education (Fraser & O'Brien, 1985) and higher education (Fraser, 1994). According to Moos (1979) and Fraser (1982) correlations between teachers' and students' perceptions are moderate to low. The former author reports an average product-moment correlation of .50 and rank-order correlation of .37, while the latter reports a product-moment correlation of .51 and rank-order correlation of .77.

A study using the Questionnaire on Instructional Behavior (Biemans, et al., 1999) in secondary vocational education reported significantly higher student than teacher perceptions on student-led control, teacher-led control, clarity and classroom management. The study also found that divergence between students' and teachers' perceptions was related to teachers' instructional style: highly controlling teachers showed more divergence than less controlling teachers.

A number of studies investigated student and teacher perceptions during a professional development programme aimed at teachers' activating behavior (Bergen, et al, 1997; Derksen, et al., 1999; Engelen, 2002; Engelen, et al., 2000). These studies showed that teacher perceptions – of activation, clarity and control - remained stable during the programmes, and if they became higher, this was accompanied by a growth in student perceptions. As a consequence, differences between students' and teachers' perceptions did not change much, and in cases where they became smaller, this was merely achieved by students' perceptions becoming higher. In one study (Derksen, et al., 1997), differences between teachers' and students' perceptions even became larger as a consequence of the intervention programme. However, none of these studies provided tests of significance for the differences found.

Thus, it seems that, regardless of the domain of teaching studied, teachers' on average have higher perceptions than their studies with respect to the areas of interest. Moreover, divergences seem hard to change and may be related to teaching styles (in terms of student perceptions).

2.3 Issues with respect to divergence between students' and teachers' perceptions

The studies reviewed above generally used difference scores – e.g. teacher minus student ratings - to investigate discrepancies. While such scores are indicative for differences between teachers' and students' perceptions, an important disadvantage is that, if difference scores over groups of persons are object of study, positive and negative difference scores may balance each other out. Therefore, Brekelmans and Wubbels (1991) advise to use both *regular* difference scores as well as *absolute* difference scores. The latter can be use to determine overall magnitudes of divergence, the former can be used to distinguish teachers with positive divergence from teachers with negative divergence.

Another problem with most of the studies is that they use *groups* of teachers and their students to determine discrepancy, but provide no means to establish whether an *individual* teacher should be regarded as convergent or divergent. Here, Brekelmans and Wubbels (1991) suggest that a difference score should be regarded as "divergence", if it becomes larger than the measurement error associated with it. If this is the case, it can be expected with at least 67% chance that the difference is larger than zero (see note 3). The measurement error of the difference score is based on reliability and variance of both teachers' and students' perceptions (see note 2).

An important issue remains how to *explain* divergence between perceptions. Some argue that student perceptions may be subject to "grading leniency" (Greenwald, 1997) and, as a consequence, may not be reliable. However, this view has been disputed because of the reciprocal nature between grading and perceptions, because many other elements determine students' perceptions, and because of the mixed evidence with respect to this assumption (Marsh & Roche, 1997). Moreover, research has shown that student perceptions are extremely reliable if elements are studied that do not relate to subject matter related (pedagogical) behavior, and that students are well able to distinguish differences in teaching style between (their) teachers (d'Apollonia & Abrami, 1997). Others argue that attributional processes and teacher ideals may influence their perception of their own teaching (Brekelmans & Wubbels, 1991; Wubbels & Levy, 1993). In this line of reasoning, higher teacher than student perceptions may be the consequence of *wishful thinking*, while lower teacher than student perceptions may be the result of *protection against disappointment*. Evidence for the influence of such thought processes was found in teachers explanations of their own ratings (Wubbels & Levy, 1993). Psychologists have also argued that role differences between raters may contribute to divergence via attributional processes: *actors* (e.g. teachers) have been found to regard their own behavior as more heavily influenced by environmental circumstances, while *observers* (e.g. students) have been found to focus on relatively stable traits or dispositions (Watson, 1982). As a consequence, both groups may focus on different elements or value elements in their observations differently, resulting in divergence. Some evidence for this view has been suggested by small-scale studies in which students and teachers were interviewed (e.g. Cothran & Ennis, 1997; Sheets, 2002).

3. Teachers' instructional behavior

In this study, teacher behavior is studied from an instructional perspective. This means that teaching is studied in terms of those behaviors that 'define' students' roles in the learning process. One important element in defining the students role is the degree to which students have control over their own learning activities (den Brok, Bergen, & Stahl, 2002). Another element is the degree to which teachers are explicit or clear about what students have to learn and how (e.g. Brekelmans, Sleegers & Fraser, 2000; den Brok, 2001). The second element is often being referred to as clarity (Cruickshank & Kennedy, 1986), the first is called teaching for active learning (Brekelmans, et al., 2000), activating instruction (Lamberigts & Bergen, 2000), control (den Brok, Bergen, & Stahl, 2002) or delegation (den Brok, 2001). Additionally, research on teacher effectiveness has shown that classroom management is an important prerequisite for student learning and student on-task behavior (Creemers, 1994; den Brok, 2001).

Since at least the days of John Dewey, educators have disagreed with respect to the different forms and degrees of control that teachers can, do and should exhibit in the facilitating students'

completion of learning tasks. Most distinguish between three graduations of teacher control (Brekelmans, et al., 2000; den Brok, 2001; Simons & de Jong, 1992; Vermunt & Verloop, 1999): (a) *strong control*, or taking over or substituting the performance of students completion of learning-related tasks; (b) *shared control*, or activating and facilitating students to take a very active part in guiding and completing the target learning tasks; and (c) *loose control*, or stimulating and motivating students to complete learning activities by themselves with little if any teacher involvement in regulating their behaviours as they complete the needed tasks. For shared control, sometimes a further distinction is made between (a) *shared responsibility between student and teacher* and (b) *shared responsibility between student and student* (den Brok, et al., 2002). Others (Shuell, 1993, 1996) distinguish between two traditional forms of control: *student-control* (i.e., student-initiated control) and *teacher-control* (i.e., teacher-initiated control).

In the case of *strong teacher control*, the teacher takes over or substitutes for the major activities needed for completing targeted learning tasks from students. Examples of this are teacher behaviours such as presenting an outline, providing students with examples, and highlighting main points. In each instance, the teacher does what students could and presumably should be doing. In the case of *loose teacher control*, the teacher assumes that students on their own initiative will begin and complete all the needed cognitive, affective and regulative learning activities by themselves. In these instances, the teacher allows students to operate freely and independently during learning activities on the assumption that students know what they are to do, are doing and are expected to do and are in fact doing all that is needed to complete the activities in an acceptable way. Some might refer to this as a form of extreme 'laissez faire' overseeing of learning tasks by the teacher. With *shared control*, students are continually activated either implicitly or explicitly by their teacher to perform and complete targeted learning activities to some desired end. Examples of this construct of regulation are such teacher behaviours as asking questions, giving assignments or assigning tasks, and stimulating students to cooperate.

Although these constructs of control within the classroom include a range of meanings and conceptualisations, they all acknowledge that completing classroom tasks is not so much about the teacher presenting information and controlling the learning process, but about a shift of responsibilities for completing these tasks from the teacher to students. Within popular conceptions of 'teaching for active learning,' a distinction is made between *teacher-led*, *student-led* and *co-student-led* control. In instances of *teacher-led control*, teachers model learning activities for the students and try to elicit the prior knowledge that is necessary for performing the learning activities. According to Lamberigts and Bergen (2000), teacher-led control is theoretically linked to ideas that can be found in cognitive constructivism, or highly teacher-centred methods, such as Direct Instruction (Rosenshine, 1978, 1983; Stahl, 1992). In instances of *co-student-led control*, teachers stimulate students to co-operate while completing the learning activities. Presumably this type of control is consistent with the theoretical assumptions of optimal cooperative learning activities and activities aligned with the most social-oriented branches of constructivism (Stahl, 1999). In the situation of *student-led control*, teachers challenge, encourage and entice students to engage in the learning activities by themselves as much as possible, while leaving to students such decisions as which activities to perform, what order are the activities to be completed, and what time will be taken to complete each part of each activity. This type of control is theoretically linked to radical-individualistic constructivism and to popular notions associated with the concept of 'powerful learning environments' (Lamberigts & Bergen, 2000).

To map teachers' instructional behavior, Lamberigts and Bergen (2000) developed the Questionnaire on Instructional Behavior (QIB). The QIB consists of 33 items. Using a five-point Likert scale, students indicate what they think of their teacher (as teachers do with respect to their own behavior). Item values vary from "1," showing the indicated behavior hardly, to "5," showing the indicated behavior very often. The items of the QIB pertain to five scales (den Brok, Bergen, & Stahl, 2002): Clarity (7 items), Classroom management (6 items), Strong teacher control (3 items), Shared teacher control (9 items) and Loose teacher control (3 items). Clarity refers to the degree to which it is clear to students what they have to do and how the (content of the) lesson is structured. Classroom management deals with the extent to which students have to obey rules set by the teacher, or the degree to which inattentive behavior is allowed. The strong teacher control scale mainly consists of items on providing students with strategies to perform their learning activities, the shared teacher

control scale with items on sharing of responsibility between students and between student and teacher, while the loose control scale focuses on students' own decision making during the performance of learning activities. The shared control factor includes items that refer to situations in which students are asked to work cooperatively as well as items that refer to situations in which students can show initiative during whole class situations. Table 1 provides a sample item for each of the scales.

Table 1
Sample items of the QIB.

Scale	Sample item
Clarity	If s/he explains something, s/he is easy to understand.
Classroom management	During his/her lesson, you can easily do something else.
Strong control	S/he provides strategies for planning school work.
Shared control	S/he stimulates us to help each other when working on a task.
Loose control	S/he lets us determine our own pace in working on tasks.

4. Hypotheses

With the issues of paragraph 2.3 in mind, this study investigated divergence and convergence between teachers' and students' perceptions of teachers' instructional behavior. As such, it focused on clarity, classroom management, strong control, shared control and loose control. Based on the literature, the following hypotheses were formulated and put to the test:

H1: On average, teachers have higher perceptions than their students with respect to control, clarity and classroom management, and more teachers can be found displaying higher perceptions with respect to these behaviors than teachers displaying lower perceptions than their students.

H2: The more experience teachers have, the smaller divergence is between their own perceptions of control, clarity and classroom management, and those of their students.

H3: Teachers with instructional styles (in terms of student perceptions) that are characterized by higher amounts of control, clarity and classroom management display smaller amounts of divergence than teachers with styles that are characterized by lower amounts of control, clarity and classroom management.

5. Method

To test our hypotheses, questionnaire data were gathered from 72 secondary education teachers - from 7 schools - and their students (n=1604). Fifty-one percent of the students was male. Students ranged in age between 13 and 17 years. Teacher experience varied between 1 and 29 years, 56 teachers had more than 10 years of experience, while 5 teachers had less than 5 years of experience. Teachers taught all school subjects, except physical education. The majority of the teachers either taught Math, Dutch Language, English as a Secondary Language or Science. About half of the teachers was male.

Both teachers and students completed the Questionnaire on Instructional Behavior (QIB). Quality of the scales of the QIB appeared to be satisfactory (see Tables 2 and 3). Reliability of the scales was sufficient: Cronbach's alpha ranged between 0.82 (Shared teacher control) and 0.92 (Classroom management) for students' perceptions and between 0.64 (Loose teacher control) and 0.75 (Strong teacher control) for teachers perceptions. Intra class correlations of the scales ranged between .16 (loose control) and .67 (strong control), meaning that significant amounts of variance could be found at the teacher-class level as compared to the (individual) student level. Thus, the scales of the QIB differentiate between teachers. Also, mean inter-scale correlations ranged between .11 and .33 for students' perceptions and between -.04 and .22 for teachers' perceptions, meaning that the scales measured distinct, though partially related elements of teachers' instructional behavior.

Table 2

Reliability, standard errors, intra class correlations (ICC) and mean correlation of QIB scale with other scales for student perception data.

Scale	Alpha students	s.e. students	ICC	Mean correlation with other QIB scales.
Clarity	.85	.18	.21	.33
Classroom management	.92	.14	.29	.11
Strong control	.83	.24	.67	.27
Shared control	.82	.22	.48	.30
Loose control	.86	.20	.16	.18

Note: s.e.=standard error

Table 3

Reliability, standard errors and mean correlation of QIB scale with other scales for teacher perception data.

Scale	Alpha students	s.e. students	Mean correlation with QIB scales.
Clarity	.73	.30	.05
Classroom management	.70	.28	.08
Strong control	.75	.40	-.04
Shared control	.68	.35	.22
Loose control	.64	.47	.10

Note: s.e.=standard error

For each of the five scales, absolute and regular difference scores were computed, as well as the measurement error[2] of the regular difference scores. We considered a difference score larger than the measurement error as divergence, while scores smaller than the measurement error were considered as convergence (e.g. Brekelmans, et al., 1991)[3]. Next, absolute and regular difference scores were studied by means of correlations, t-tests, analyses of variance and cross tabular analyses to uncover the direction of the differences and establish relationships with teacher experience, which was measured as a categorical variable with the score 0 (1 - 5 years), 1 (6 – 10 years) or 2 (> 10 years). To test the last hypothesis, cluster analyses (squared Euclidian distances, Ward method) were performed to detect specific "styles" of instructional behavior and determined if these styles displayed different amounts of divergence[4].

[2] To calculate measurement error (m.e.) in the difference scores we used the equation: $m.e.= \sqrt{(se_t^2 + se_{st}^2)}$; se_t, se_{st} = standard error of measurement (se) in scale scores of the perceptions of teachers (t) and students (st). To calculate the standard error of measurement in the scale scores we used the equation: $se= st \sqrt{(1-r_{tt})}$; st=standard deviation of the scale score, r_{tt}=reliability of the scale scores, represented by Cronbach's alpha.

[3] When a difference score is larger than the measurement error we can expect, with at least 68% certainty, that this difference score is larger than zero. When a difference score is about twice as large as the measurement error, the expectation has a certainty of more than 95%.

[4] Student perceptions, rather than teacher perceptions or a combination of both, were used in these cluster analyses to determine instructional styles. One reason for this was the advantage student perceptions have over teacher perceptions (e.g. Fraser, 1982; den Brok, 2001): they are based on a series of lessons and comparison with other teachers, are less subject to mood swings or contextual influences due to the large number of students within a class and are usually very reliable. Another reason is the pragmatic importance of student perceptions: students' behavior in class and their outcomes are determined by the effect teacher behavior has on them (hence: their perception), rather than by how teachers perceive themselves. Other reasons are comparability to earlier research, the rather low number of teachers to obtain stable results when combining them with other variables and differences in conceptual structure of teacher perceptions (den Brok, Bergen & Stahl, 2002).

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6. Results

The first step in the analyses consisted of computing absolute and regular difference scores, and measurement error of the difference scores. The results of these analyses are displayed in Table 4.

Table 4

Measurement errors (m.e.) of difference scores, mean absolute difference scores and mean difference scores (scores represent student minus teacher perceptions) for QIB scales.

Scale	m.e. difference score	Mean absolute difference score (s.d.)	Mean difference score (s.d.)
Clarity	.35	.49 (.38)	-.04 (.62)
Classroom management	.31	.50 (.35)	.07 (.61)
Strong control	.47	.96 (.71)	-.75 (.93)
Shared control	.41	.51 (.43)	-.38 (.55)
Loose control	.51	.61 (.47)	.08 (.77)

Note: m.e.=standard error; s.d.=standard deviation

As can be seen in Table 4, mean absolute difference scores are larger than the measurement errors. This means that, on average, a divergence is found between teachers' and students' perceptions for all QIB scales. However, considerable differences can also be found in the absolute (and regular) difference scores, indicating that some teachers only marginally differ from their students in their perceptions, while others differ considerably. In the case of clarity, classroom control and loose control, positive and negative divergence seem to balance each other out – since mean difference scores are close to zero -, while in the case of strong and shared control more negative divergence (higher teacher than student ratings) can be found.

Table 5 presents the numbers of teachers with divergence and convergence. As can be seen, about half of the teachers is divergent on the shared and loose control scales, while about two-third of the teachers is divergent for clarity, classroom management and strong control. The patterns of divergence are different from scale to scale: by far the majority of the teachers has higher ratings than their students on the strong control and shared control scale (as was already predicted from the results in Table 4); just over half of the teachers "overestimates" on the clarity scale; less than half of the teachers to about one third has higher perceptions than their students on the classroom management and loose control scales.

Table 5

Teachers with convergence (difference score smaller than measurement error), overestimating (teacher rating higher than student rating) and underestimating (teacher rating lower than student rating) on the scales of the QIB.

Scale	Convergence	Overestimating	Underestimating
Clarity	30	24	18
Classroom management	29	18	25
Strong control	22	43	7
Shared control	36	31	5
Loose control	34	14	24

To test the second hypothesis, we compared the experience of teachers with divergence and teachers with convergence. In this manner, two groups were formed: one with divergent teachers and one with convergent teachers. The mean experience of these groups per scale was compared with a t-test. The results of these analyses are reported in Table 6.

Table 6

Average experience of teachers with convergence and divergence between student and teacher perceptions.

Scale	Convergence	Divergence	T-value	P (sig)
Clarity	.53 (.78)	.76 (.88)	-1.142	.257
Classroom management	.55 (.78)	.74 (.88)	-.954	.343
Strong control	.64 (.79)	.68 (.87)	-.202	.841
Shared control	.75 (.84)	.58 (.84)	-.841	.403
Loose control	.56 (.79)	.76 (.88)	-1.032	.306

Note:
Experience can be scored as 0 (< 5 years), 1 (6 – 10 years) or 2 (> 10 years).

It seems that the group of teachers with convergence is almost as experienced as the group of teachers with divergence. Thus, results of Table 6 show no statistically significant relationship between experience and divergence. To investigate the relationship between experience and divergence more in detail, we compared the amount of divergence between the three experience groups. The difference scores are compared by means of an analysis of variance (ANOVA) and presented in Table 7.

Table 7

ANOVA for experience on absolute difference scores in QIB scales.

Scale	< 5 years	6 – 10 years	> 10 years	F-value	P (sig)
Clarity	.53 (.43)	.48 (.28)	.43 (.31)	.407	.667
Classroom management	.48 (.35)	.44 (.32)	.59 (.37)	.872	.423
Strong control	.94 (.70)	1.01 (.89)	.97 (.60)	.042	.958
Shared control	.60 (.47)	.35 (.28)	.44 (.40)	2.113	.129
Loose control	.62 (.48)	.55 (.48)	.63 (.47)	.141	.869

According to Table 7, difference scores are not statistically different for the three experience groups. The largest, non-significant difference can be found for shared control: teachers with less than 5 years of experience have somewhat higher difference scores than teachers with more than 5 years of experience. Again, these outcomes indicate no relationship between experience and divergence or convergence. As a last check, we compared the amount of experience for teachers with higher perceptions than their students (overestimation) and teachers with lower perceptions than their students (underestimation) (see Table 8).

Table 8

Average experience for teachers with overestimation and teachers with underestimation on QIB scales.

Scale	Underestimation	Overestimation	T-value	P (sig)
Clarity	1.22 (.94)	.42 (.65)	3.108	.004
Classroom management	1.08 (.91)	.28 (.57)	3.538	.001
Strong control	.57 (.79)	.70 (.89)	-.354	.725
Shared control	.60 (.89)	.58 (.85)	.047	.963
Loose control	.96 (.91)	.76 (.20)	1.840	.074

Table 8 reports some significant results. It seems that the group with lower teacher than student perceptions on the clarity scale is more experienced than the group with higher teacher than student perceptions. A similar pattern is found for the classroom management scale. The same pattern is also found for the loose control scale, although the difference is not significant. Thus, according to these last analyses, teachers that have higher perceptions than their students on a number of scales are less experienced than teachers that have lower perceptions than their students. It may be that inexperienced teachers are more idealistic than experienced teachers, as they are less shaped by everyday practice and influence of their teacher training may still be present. This 'idealism' may lead to wishful thinking, resulting in higher perceptions of their own behavior as compared to perceptions of others (students).

To check whether teaching style was related to the amount of divergence or convergence, we first distinguished between different instructional styles. This was done by performing a cluster analysis (in SPSS). The cluster analysis was set up in such a manner, that it resulted in groups with maximally different styles. To check if differences between styles were significant with respect to the scale scores, analyses of variance (ANOVA) and Scheffé tests for post-hoc comparisons were performed. It seemed a distinction in four styles was optimal and yielded interpretable patterns and sufficiently large groups. These four styles were labeled as follows: 'teacher-centered' (24 teachers, scoring particularly high on clarity, classroom management and strong control), 'laissez-faire' (9 teachers, scoring low on all scales, except for loose teacher control), 'student-centered' (21 teachers, scoring particularly high on shared and loose teacher control and moderately high on the other scales), and 'ineffective' (18 teachers, scoring low on all variables). The mean scale scores for each of the four styles are graphically presented in Figure 1.

Figure 1
Profiles of instructional styles of teachers (N=72).

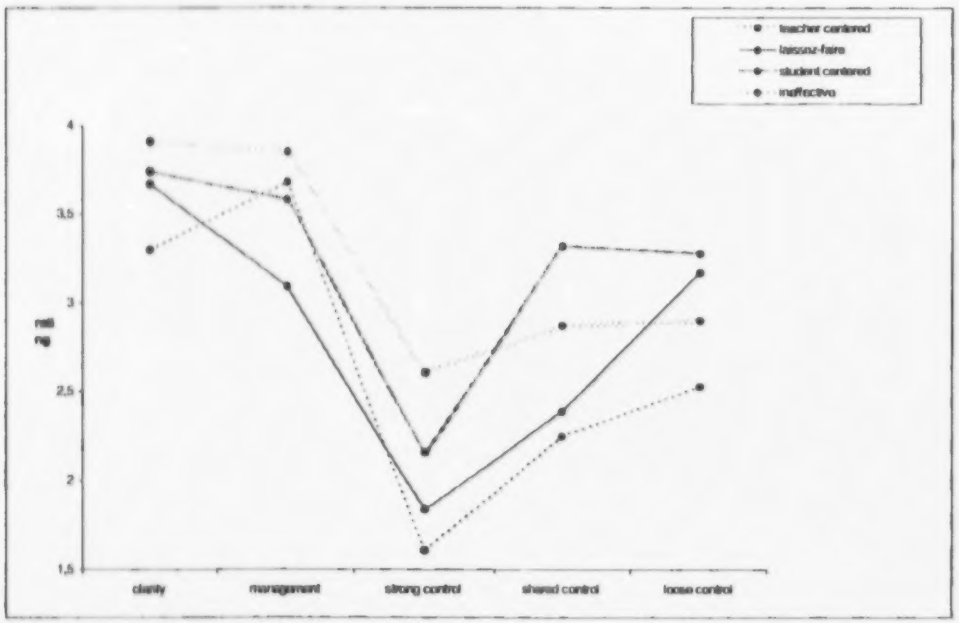

Table 9

Number of teachers with convergence and divergence between student and teacher perceptions on QIB scales according to teaching profile.

Scale	Profile	Convergence	Divergence	Chi-squared	P (sig)
Clarity	Teacher-cent	11	13	7.029	.071
	Laissez-faire	7	2		
	Student-cent	7	14		
	Ineffective	5	13		
Classroom management	Teacher-cent	11	13	.775	.855
	Laissez-faire	4	5		
	Student-cent	8	13		
	Ineffective	6	12		
Strong control	Teacher-cent	11	13	4.610	.203
	Laissez-faire	2	7		
	Student-cent	6	15		
	Ineffective	3	15		
Shared control	Teacher-cent	10	14	1.937	.586
	Laissez-faire	6	3		
	Student-cent	10	11		
	Ineffective	10	8		
Loose control	Teacher-cent	9	15	2.810	.422
	Laissez-faire	4	5		
	Student-cent	13	8		
	Ineffective	8	10		

Note: Teacher-cent=teacher-centered, student-cent=student centered.

When comparing the four teaching styles (teacher-centered, laissez-faire, student-centered, ineffective) by means of a cross tabular analysis, we found no significantly different numbers of teachers showing divergence and convergence (see Table 9). Nevertheless, results were almost significant for clarity: here, more teachers with convergence than divergence could be found for the Laissez-faire style, while for the other three styles more teachers with divergence than convergence could be found. Such patterns were recognizable also for the strong and shared control scales, but - as was the case for clarity – not statistically significant.

Teachers with teacher-centered and laissez-faire instructional styles showed smaller amounts of divergence for 'clarity' than teachers with other styles. Moreover, teachers with a teacher-centered instructional style displayed lower amounts of divergence on 'strong control' than teachers with other styles. For all other scales, amounts of divergence were not statistically different between instructional styles (see Table 10).

Table 10

ANOVA of absolute difference scores between student and teacher perceptions on QIB scales for different teaching profiles.

Scale	Profile	Difference score	F-value	P (sig)
Clarity	Teacher-cent	.39 (.28)	3.036	.035
	Laissez-faire	.31 (.39)		
	Student-cent	.55 (.39)		
	Ineffective	.66 (.40)		
Classroom management	Teacher-cent	.47 (.36)	.272	.845
	Laissez-faire	.44 (.35)		
	Student-cent	.51 (.34)		
	Ineffective	.55 (.38)		
Strong control	Teacher-cent	.55 (.37)	5.173	.003
	Laissez-faire	1.18 (.96)		
	Student-cent	1.07 (.65)		
	Ineffective	1.27 (.76)		
Shared control	Teacher-cent	.49 (.37)	.581	.629
	Laissez-faire	.37 (.32)		
	Student-cent	.52 (.40)		
	Ineffective	.59 (.56)		
Loose control	Teacher-cent	.65 (.48)	1.794	.156
	Laissez-faire	.53 (.29)		
	Student-cent	.44 (.44)		
	Ineffective	.77 (.53)		

Note: Teacher-cent=teacher-centered, student-cent=student centered.

When checking for the direction of difference scores, statistical differences were found for 'clarity' and 'loose control' (see Table 11). It appeared that for the ineffective style, more teachers could be found with higher perceptions than their students on these two scales, while most teachers in the other styles had lower perceptions than their students. No distinctive patterns could be found for the other variables.

Table 11

Number of teachers underestimating and overestimating on QIB scales for each of the teaching profiles.

Scale	Profile	Underestimating	Overestimating	Chi-squared	P (sig)
Clarity	Teacher-cent	7	6	9.872	.02
	Laissez-faire	1	1		
	Student-cent	9	5		
	Ineffective	1	12		
Classroom management	Teacher-cent	10	3	4.972	.174
	Laissez-faire	1	4		
	Student-cent	7	6		
	Ineffective	7	5		
Strong control	Teacher-cent	4	9	4.377	.224
	Laissez-faire	1	6		
	Student-cent	1	14		
	Ineffective	1	14		
Shared control	Teacher-cent	2	12	3.424	.331
	Laissez-faire	-	3		
	Student-cent	3	8		
	Ineffective	-	8		
Loose control	Teacher-cent	10	5	8.203	.042
	Laissez-faire	5	-		
	Student-cent	6	2		
	Ineffective	3	7		

As a last check, we computed correlations between student perceptions of the instructional variables and absolute difference scores (Table 12). It was found that the higher teachers were perceived on 'classroom management' by their students, the smaller their difference scores were (correlation was -.31 with a p-value of .008). A similar correlation was found for 'shared control' (correlation of -.41, p-value of .004).

Table 12
Correlation between absolute difference scores and student perception scores for QIB scales.

	Clarity	Classroom management	Strong control	Shared control	Loose control
Correlation	-.25	-.31 *	-.07	-.41 *	-.22

Note: *=significant at .025
Negative values indicate that the lower the lower the students' perceptions on the scale, the larger the absolute difference between student and teacher perceptions.

7. Discussion

In this study, three hypotheses with respect to differences between teachers' and students' perceptions of teachers' instructional behavior were put to the test. According to the first hypothesis, most of the teachers would have higher perceptions than their students on most of the instructional behavior scales of the QIB. This hypothesis was partially confirmed: about one-third to half of the teachers differed considerably – e.g. more than the measurement error of the difference – from their students, and of these divergent teachers, three quarters to less than half of the teachers had higher perceptions than their students. While these findings show patterns that are similar to those found in studies on interpersonal teacher behavior (e.g. Brekelmans & Wubbels, 1991) in many respects, there are also a number of striking differences. First of all, there is much variation between scales in the degree of divergence and amounts of teachers with divergent scores. More teachers seem to be divergent for the shared and loose control scales than for the other scales. Also, there is variation between scales in the direction of divergence: while the majority of the teachers with divergence has higher perceptions than their students for the strong and shared control scales, the majority of the teachers with divergence has lower perceptions than their students for the classroom management and loose control scales. It may be that some behaviors, such as clarity or strong control, are easier for teachers to (self-)observe than some of the other behaviors. Also, recent, large-scale educational reforms in the Netherlands aiming at more student independence and self-directed learning may have led to wishful thinking on the part of the teachers. Of course, these interpretations are highly speculative, and more research is needed to provide empirical evidence. Such research should include teachers' explanations for their self-observations and interpretations of their own behavior in the classroom, which could be extracted, for example, by means of interviews or classroom observations.

The second hypothesis stated that experienced teachers would show less divergence than relatively inexperienced teachers. This hypothesis could not be confirmed: no statistical relationship was found between teacher experience and divergence. Nevertheless, we did find that teachers with positive divergence (e.g. higher perceptions than their students) on clarity and classroom management were relatively inexperienced, while teachers with negative divergence on these scales were more experienced. The weak or absent relationship between experience and divergence is in line with the results of the study by Brekelmans and Wubbels (1991) on interpersonal behavior. However, given the mixed findings in earlier research as well as in the present study, more research on larger groups of teachers is needed to provide more convincing evidence for a possible relationship between experience and divergence. A valuable addition in this respect would be the use of longitudinal data.

The third and last hypothesis assumed that divergence would be related to instructional (teaching) style. Some evidence was found in favor of this hypothesis. It seemed that 'ineffective' teachers displayed more divergence for clarity, while 'teacher-centered' teachers were less divergent on clarity and strong control than teachers with other styles. Also, the amount of clarity and shared control perceived by students was related to the amount of divergence: higher amounts related to lower divergence. These findings are in line with research in the interpersonal domain (Brekelmans & Wubbels, 1991; Wubbels, et al., 1987; 1992) and earlier research with the QIB (Biemans, et al., 1999).

An important issue that remains after this study is how to explain divergence. In a rational-cognitive-action view (e.g. Clark & Peterson, 1986) one would expect close resemblance between teachers' own perceptions and those of their students. In this view it is assumed that teachers are rational actors that base their behavior (in this case behavior perceived by students) on their cognitions (of which self-perceptions and ideals can be regarded as elements) to a large degree. However, it seems very likely that teachers not always act as rational professionals due to the nature of the classroom context (Doyle, 1986) and the unconscious nature of many cognitions (Fiske & Taylor, 1991; Korthagen & Lagerwerf, 1996). Moreover, personal theories of teachers (e.g. Groeben, 1981) may play an important role in the teaching process. Such theories often contain inconsistent elements and act as strong framework and filters that teachers use to interpret their environment. Of course, attributional processes and role differences between teachers and students (see section 2.3) may also be helpful in explaining divergence. More research is needed in this respect, particularly aimed at uncovering explanations provided by teachers and students (by means of interviews and observations) for divergence found. Also, interviews with teachers and students may help to uncover important variables or indicators that form the basis of observations, and consequently perceptions. For example, are perceptions of students and teachers based on the same observational cues? Are students' and teachers' definitions of clarity and control, among many other behaviors, similar? Then, studies could be conducted relating various class and teacher characteristics to difference scores (absolute and regular), not only investigating effects of these characteristics *separately* (as was done in the present study), but also *jointly* and/or *in interaction*.

The outcomes of the present study seem to suggest that the amount and direction of divergence may be related to the particular teacher behavior of interest. It may very well be that teachers more easily can observe and interpret the effects of some behaviors, while it is hard for them to judge the effect of other behaviors. Future research, investigating other (combinations of) teacher behaviors can help in sorting out this issue.

Finally, the outcomes of this study stress the importance of using different sources when providing feedback to teachers or investigating the classroom environment. Using only the perceptions of teachers or students may lead to a one-sided and incomplete view, since considerable differences may occur between them. Conceptualizing and computing divergence may be a powerful tool in studying the relationship between teachers' thoughts and actions. Moreover, they can be used as a means of reflection, providing more insight in teachers' own beliefs and those of their students. They may form the starting point for changing particular behavior, and as such act as points to seize upon in the preparation of teachers and in staff-development. Of course, an interesting question in this respect would be if such training and development can help to reduce differences, either through a change in self-perception or an alteration of behavior.

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Appendix A

Overview of studies investigating both students' and teachers' perceptions of teachers' behaviors in secondary (vocational) education. Studies appear in chronological order.

Authors and year of publication	N	Teaching variables studied	Goal and method of study
Beam & Horvat, 1975	33	Inquiry	Alignment between observation and perception data. Divergence of direct interest. Divergence tested with t-tests.
Moos, 1979	295	Competition, formality, involvement, rule clarity, cohesiveness, satisfaction, task difficulty, goal direction, democracy	Exploratory study on student and teacher perceptions. Divergence of direct interest. Divergence tested with ANOVA, product-moment correlations and rank-order correlations
Fraser, 1982	34	Student participation, personal interaction, differentiation, inquiry, student independence	Study on differences between actual and preferred (ideal) perceptions. Divergence of direct interest. Divergence tested with ANOVA, product-moment correlations and rank-order correlations.
Fisher & Fraser, 1983	56	Student participation, personal interaction, differentiation, inquiry, student independence	Study on differences between actual and preferred (ideal) perceptions. Divergence of minor interest. Divergence tested with ANOVA.
Hofstein & Lazarowitz, 1986	52	Student participation, personal interaction, differentiation, inquiry, student independence	Study on differences between actual and preferred (ideal) perceptions in different subjects. Divergence of minor interest. Divergence tested with ANOVA.
Wubbels, Brekelmans & Hermans, 1987	66	Leadership, helpful/friendly, understanding, student responsibility, uncertain, dissatisfied, admonishing, strict	Study on instrument development and reliability of student perceptions. Divergence of direct interest. Divergence tested with product-moment correlations and t-tests.
Gorham & Zakahi, 1990	46	Verbal immediacy, nonverbal immediacy (22 indicators in total)	Study on instrument development. Divergence of direct interest. Divergence tested with t-tests.
Brekelmans & Wubbels, 1991	1156	Influence, proximity	Large-scale study on divergence between teacher and student perceptions. Divergence of direct interest. Divergence tested with t-tests, ANOVA and difference scores.
Wubbels & Levy, 1991	132	Leadership, helpful/friendly, understanding, student responsibility, uncertain, dissatisfied, admonishing, strict	Study on instrument development. Divergence of minor interest. Divergence tested with t-tests.
Wubbels, Brekelmans & Hooymayers, 1992	143	Interpersonal quality (average absolute difference on leadership, helpful/friendly, understanding, uncertain, dissatisfied and admonishing)	Study on differences between cognitions (ideals and teacher perceptions) and behavior (student perceptions. Divergence of direct interest. Divergence tested with t-tests and difference scores.
Fisher, Fraser, Wubbels & Brekelmans, 1993	276	Influence, proximity	Study on relationship between instruments used to map teacher environment and school environment. Divergence of minor interest. Divergence not statistically tested.

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Brekelmans, Holvast & van Tartwijk, 1993	573	Influence, proximity	Study on development of interpersonal behavior during the teaching career. Divergence not of interest. Divergence not statistically tested.
Levy, Wubbels & Brekelmans, 1993	141	Influence, proximity	Study on factors influencing teacher or student perceptions. Divergence not of interest. Divergence not statistically tested.
Witty & DeBarysch, 1994	14	Encouragement of student involvement, avoidance of negative interaction, personal regard, individualized support	Study on teacher expectations. Divergence of direct interest. Divergence tested with t-tests.
Fisher, Fraser & Cresswell, 1995	6	Leadership, helpful/friendly, understanding, student responsibility, uncertain, dissatisfied, admonishing, strict	Descriptive study on teacher professional development. Divergence not of interest. Divergence not statistically tested.
Fraser & Wubbels, 1995	?	Task orientation, order, rule clarification	Study on teacher instructional behavior. Divergence of minor interest. Divergence tested with ANOVA.
Maor & Fraser, 1996	10	Task orientation, order, rule clarification	Exploratory study on teacher behavior in computer-assisted classrooms. Divergence of minor interest. Divergence tested with ANOVA.
Cothran & Ennis, 1997	4	Conflict, teacher power	Desciptive study on teacher professional development. Divergence not of interest. Divergence not statistically tested.
Levy, Wubbels, Brekelmans & Morganfield, 1997	38	Influence, proximity	Study on culture/ethnicity and student perceptions of teacher behavior. Divergence of minor interest. Divergence tested with ANOVA.
Wubbels & Brekelmans, 1997	45	Leadership, helpful/friendly, understanding, student responsibility, uncertain, dissatisfied, admonishing, strict	Study on differences in perceptions and beliefs over time. Divergence of minor interest. Divergence tested with t-tests.
Harkin & Turner, 1997	30	Leadership, helpful/friendly, understanding, student responsibility, uncertain, dissatisfied, admonishing, strict	Study on instrument development in higher education. Divergence of minor interest. Divergence tested with t-tests.
Gorham & Millette, 1997	?	Motivation enhancement	Study on factors influencing student and teacher behaviors. Divergence not of interest. Divergence not statistically tested.
Biemans, Jongmans, de Jong & Bergen, 1999	145	Student-led activation, teacher-led activation, clarity, control	Study on instructional behavior in vocational education. Divergence of direct interest. Divergence tested with ANOVA and difference scores.
Derksen, Engelen, Sleegers, Bergen & Imants, 1999	22	Student-led activation, teacher-led activation, clarity, control	Study on the effects of a professional development programme. Divergence not of interest. Divergence not statistically tested.
Fisher & Rickards, 2000	173	Leadership, helpful/friendly, understanding, student responsibility, uncertain, dissatisfied, admonishing, strict	Study on value of student and teacher perceptions for professional development. Divergence of direct interest. Divergence tested with ANOVA.

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Rickards & Fisher, 2000	164	Leadership, helpful/friendly, understanding, student responsibility, uncertain, dissatisfied, admonishing, strict	Study on value of student and teacher perceptions for professional development. Divergence of direct interest. Divergence tested with t-tests.
Ben-Chaim & Zoller, 2001	138	Leadership, helpful/friendly, understanding, student responsibility, uncertain, dissatisfied, admonishing, strict	Study on instrument development in higher education and professional development. Divergence of direct interest. Divergence tested with rank-order correlations.
Brekelmans, Wubbels & den Brok, 2002	51	Influence, proximity	Study on development of interpersonal behavior during the teaching career. Divergence not of interest. Divergence not statistically tested.
Den Brok, Levy, Rodriguez & Wubbels, 2002	17	Influence, proximity Leadership, helpful/friendly, understanding, student responsibility, uncertain, dissatisfied, admonishing, strict	Study on ethnicity/culture and student or teacher perceptions. Divergence of minor interest. Divergence tested with t-tests.
Engelen, 2002	22	Teacher-led activation, student-led activation	Study on effects of professional development programme and coaching on student or teacher perceptions. Divergence not of interest. Divergence not statistically tested.
Sheets, 2002	4	Disciplinary behavior	Study on culture/ethnicity and perceptions of students or teachers. Divergence not of interest. Divergence not statistically tested.

Note:
N=number of teachers involved

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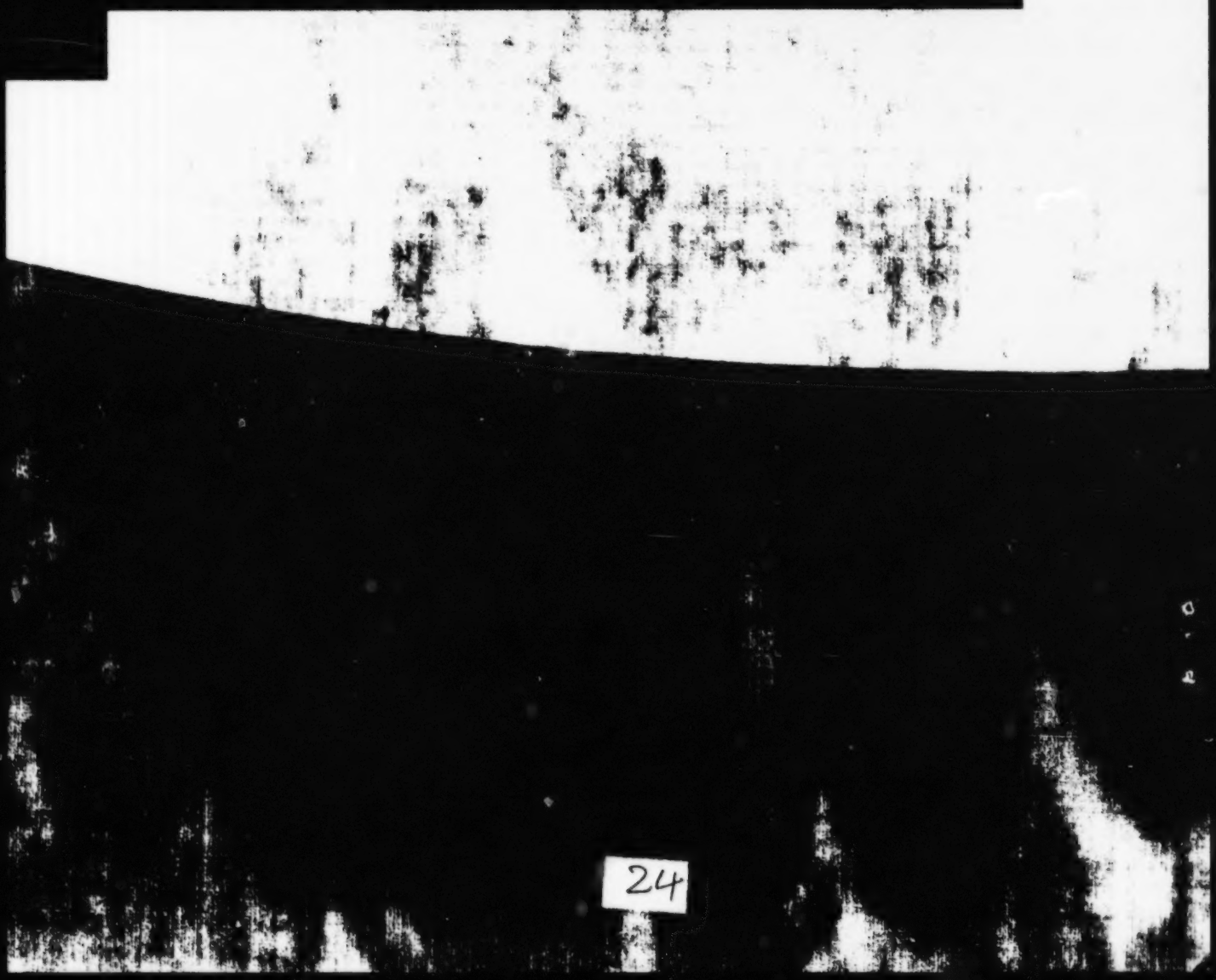

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